



DATA

SHEET

212.60

1/11/66

Technical Data

TYPE FE-1-4.5 FREQUENCY EXTENDER



The CEI type FE-1-4.5 Frequency Extender tunes from 1 gc to 4.5 gc in two bands: 1 gc to 2 gc and 2 gc to 4.5 gc. The unit converts signals in this frequency range to a 160-mc intermediate frequency output. The 160-mc output can then be tuned in on the CEI 900-series Receivers and many other receivers which tune to 160-mc. Another method of signal processing could consist of connecting the 160-mc output to a CEI type IFC-21 converter which will further convert the 160-mc IF to a 21.4-mc IF. The 21.4-mc signal can then be used as an input to a demodulator system such as the CEI type DM-4 (see data sheet 724.50).

The FE-1-4.5 represents a significant advance in the design of instruments which tune the 1 gc to 4 gc range, particularly in the area of size. The FE-1-4.5 is constructed in a standard 19-inch panel which is only 3.5-inches high. Previously, 10.5-inches of vertical rack space was required for coverage from 1 gc to 4 gc. The FE-1-4.5 also includes a tape frequency dial for increased readability and smooth, trouble-free operation.

The design of the FE-1-4.5 includes a tunable, four-section YIG preselector for each band to provide low oscillator radiation and high image rejection. The unit is electronically tracked across the two bands, thus avoiding the complex mechanical drives often used for tracking in this frequency range.

Special features of the FE-1-4.5 include an analog tuning voltage output, provisions for external AGC input, a 160-mc signal monitor output, a local oscillator output, a band indicator output, and provisions for external automatic phase or frequency control of the local oscillator. Please inquire for details concerning the application of these features.

SPECIFICATIONS

Frequency Range	950 to 4500 mc in two Bands: Band A: 950 to 2050 mc Band B: 1950 to 4500 mc
Noise Figure	18 db, maximum
Antenna Conducted L.O. Radiation	40 microvolts (-75 dbm), maximum
Image Rejection	70 db, minimum

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SPECIFICATIONS (Cont'd.)

IF Rejection	90 db, minimum
Output Frequency	160 mc
Overall Bandwidth.	8 mc, minimum
Overall Gain	20 db, nominal
Gain Variation	±3.5 db, maximum
Input Impedance	50-ohms, nominal
Input VSWR.	2.5:1, maximum
Output Impedance	For use with 50-ohm load
Dial Calibration	±1%
Dial Resetability	±0.5%
Local Oscillator FM	1 kc, peak, maximum
Local Oscillator Drift	50 parts in 10 ⁶ /°C
Local Oscillator Output Level	-5 dbm, minimum
Dynamic Range	1 db compression, maximum, for -25 dbm input without external AGC 1 db compression, maximum, for -10 dbm input with external AGC applied.
Input AGC Characteristics	Delayed to -10 volt input; approximate gain reduction 2 db/volt to -20 volt input
Fine Tuning Range	±250 kc, minimum
Frequency Readout	Tape display
Power Requirements	115/230 volts, 50-400 cps
Average Power Consumption	30 watts
Size	3.5-inches high, 19-inches wide and 18-inches deep
Weight.	25 lbs., approximately

PRICE: \$8,500.00

FOB Rockville, Maryland. Taxes extra where applicable. Price and specifications subject to change without notice.



DATA

SHEET

611.50

7/31/64

Technical Data

TYPE HFM-8 MULTICOUPLER



The CEI HFM-8 series Multicouplers provide optimum coupling between a single antenna and as many as eight receivers in the 2-30 mc frequency range. Compact in size (only 3.5-inches high), the HFM-8 provides a nominal gain of 8 db, a low noise figure of 10 db max., and high isolation between all outputs while keeping the intermodulation to a minimum. The use of Nuvistors keeps the power consumption at a minimum while providing high reliability. Quick change connectors are provided on the front panel of the type HFM-8 and on the rear apron of the HFM-8-1; BNC connectors on the front panel of the HFM-8-2 and on the rear apron of the HFM-8-3. The input and output impedance is normally supplied at 75 ohms, but other impedances can be provided.

SPECIFICATIONS

Frequency Range	2-30 mc, flat ± 2 db
Input Impedance	75 ohms
Gain	8 db nominal
Noise Figure.	10 db maximum
RF Connectors.	Coaxial quick change (RCA dimensions) or BNC
Isolation between Outputs . . .	50 db minimum
Isolation, Output to Input . . .	60 db minimum
Output Impedance	75 ohms
Size	19 inches x 3.5 inches x 11 inches
Mounting	Standard 19-inch relay rack mount
Weight	8 lbs., approximately
Power.	115/230 v, 50/60/400 cps, 32 watts

Price: \$400.00

FOB Rockville, Maryland. Taxes extra where applicable. Price and specifications subject to change without notice.

Available Accessories:	High pass filter HPF-2 (Attenuates below 2 mc)	\$25.00
	Coaxial Plug (Use with Models HFM-8 and HFM-8-1)	\$ 5.00

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DATA

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148.50

1/11/66

Technical Data

TYPE 416 PULSE RECEIVER



The CEI Type 416 Receiver is a crystal-controlled unit providing reception in the 60 mc to 150 mc range for pulse-modulated signals. A front-panel switch allows the selection of one of four preset channels within the frequency range of the individual receiver. The 60 mc to 150 mc frequency range is covered in four standard tuners. The standard frequency ranges, crystal frequencies, and channel coverage within the range are listed in the table below. The Band A and Band B frequency ranges shown in the table are the standard ranges established at the factory; however, any of the four channels can be readily set on either Band A or Band B by field maintenance personnel.

All active elements in the receiver are solid state, resulting in low power requirements and high reliability. The receiver is light weight and small in size. Up to four of these receivers can be mounted in a 7-inch high by 19-inch wide equipment frame. A 21.4-mc output is provided for connection to a signal monitor (SM-4301 is the companion unit) for a visual display of signals in a band around the received signal.



RACK MOUNT AVAILABLE

The 416 Receiver mounts in specially designed frames. In the inset photograph, a receiver and a SM-4301 Signal Monitor are shown in an EF-402 Equipment Frame; see data sheet 725.50 for details on the frame. The SM-4301 Signal Monitor is described in data sheet 322.50.

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SPECIFICATIONS

Frequency Range	60-150 mc in four standard tuners
Number of Channels	Four channels, pre-tuned, crystal controlled
Type of Reception	Pulse
Crystal Type	CR-82/U for received frequencies up to 146 mc; CR-82/U correlated (such as Piezo 4202) above 146 mc.
Input Impedance.	50 ohms, nominal, type BNC connector
Noise Figure	6.5 db, maximum
Image Rejection.	Greater than 55 db
IF Rejection.	Greater than 65 db
Oscillator Radiation at Antenna Input	10 μ v maximum
IF Frequency	21.4 mc
IF Bandwidth	2 mc
Tangential Sensitivity.	-95 dbm, minimum
Output Stability	Output pulse amplitude varies less than 4 db for a input signal level change of 10 μ v to 10 mv.
Pulse Repetition Rate	200 pps, minimum
Manual Gain Control Range.	Greater than 60 db
Video Output	Positive pulse out; one volt into a 93-ohm load; type BNC connector.
Signal Monitor Output.	21.4-mc IF output provided for signal monitor connection
Meter	Signal strength
Power Input	115 volts, 50-400 cps
Power Consumption	3.5 watts
Weight.	6.5 lbs.
Size	4.5-inches wide, 5.0-inches high, and 16.5-inches deep

Table of Standard Tuning Ranges*

Receiver Type	Over-all Freq. Range (mc)	Band A Freq. Range (mc)	Band B Freq. Range (mc)	Band/Alignment Frequencies (mc)**			
				Ch1	Ch2	Ch3	Ch4
416-1	60-90	60-75	75-90	A/60	A/75	B/75	B/90
416-2	75-110	75-90	90-110	A/75	A/90	B/90	B/110
416-3	90-130	90-105	105-130	A/90	A/105	B/105	B/130
416-4	110-150	110-125	125-150	A/110	A/125	B/125	B/150

Notes:

- * - Crystal frequencies determined as follows where f_c is the crystal frequency and f_o is the operating frequency: 416-1: $f_c = f_o + 21.4$ mc
416-2, -3, -4: $f_c = f_o - 21.4$ mc

- ** - Units are shipped to operate on the bands and alignment frequencies shown in the table unless otherwise specified.

PRICE: \$995.00

FOB Rockville, Maryland. Taxes extra where applicable. Price and specifications subject to change without notice.

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DATA

SHEET

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1/11/66

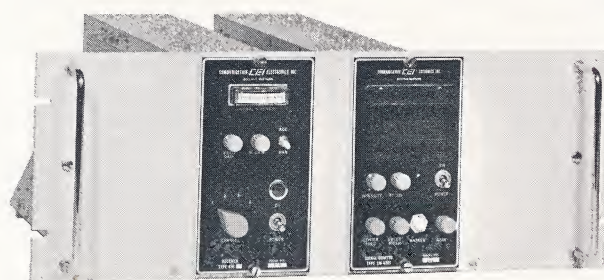
Technical Data

TYPE 415 AM RECEIVER



The CEI Type 415 Receiver is a completely transistorized, fixed-tuned unit designed for AM reception in the 60 mc to 150 mc frequency range. This range is covered using four standard tuners. A front-panel switch allows the selection of one of four preset channels within the frequency range of the individual receiver. The standard frequency ranges, crystal frequencies, and channel coverage within the range are shown in the table below. The Band A and Band B frequency ranges shown in the table are the standard ranges established at the factory, however, any of the four channels can be readily set on either Band A or Band B by field maintenance personnel.

Special features of the Type 415 Receiver include its small size, light weight, and low power consumption. Up to four of these receivers can be mounted in a 7-inch high by 19-inch wide rack. A 21.4-mc output is provided from the receiver for connection to a CEI signal monitor (the companion unit is the SM-4301) for a visual display of signals in a band around the received signal. The IF bandwidth of the receiver is available at 50 kc or 100 kc; the 50-kc bandwidth is supplied unless the 100-kc bandwidth is specified.



RACK MOUNT AVAILABLE

A specially designed mount is available for the 415 and 416 Receivers and the SM-4301 Signal Monitor. The EF-402 Equipment Frame is shown; see data sheet 725.50 for details on the frame. The SM-4301 Signal Monitor is described in data sheet 322.50.

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SPECIFICATIONS

Frequency Range	60-150 mc in four standard tuners
Number of Channels	Four channels, pre-tuned, crystal controlled.
Type of Reception.	AM
Crystal Type	CR-82/U for received frequencies up to 146 mc; CR-82/U correlated (such as Peizo 4202) above 146 mc
Input Impedance.	50 ohms, nominal, type BNC connector
Noise Figure	Less than 6.5 db
Image Rejection.	Greater than 55 db
IF Rejection.	Greater than 65 db
Oscillator Radiation at Antenna Input	10 μ v, maximum
IF Frequency	21.4 mc
IF Bandwidth	50 kc unless 100 kc is specified
Sensitivity.	50 kc: 1.75 μ v input, modulated 50% at 1-kc rate, will produce 10 db (s plus n)/n, minimum 100 kc: 2.5 μ v input, modulated 50% at 1-kc rate, will produce 10 db (s plus n)/n, minimum
Audio Output Stability.	Amplitude varies less than 3 db for an input signal level change from 1 μ v to 10 mv.
Manual Gain Control Range.	60 db, minimum
Noise Limiting	In or out, determined by front-panel switch. When in, series noise limiting provided with limiting level automatically adjusted.
Squelch	Adjustable to operate over an input signal range from 1 μ v to 50 μ v
Audio Output	15 mv across 600-ohm load
Audio Response	Less than 3 db variation from 300 cps to 5 kc
Signal Monitor Output.	21.4-mc IF output provided for signal monitor connection
Meter	Signal strength
Power Input	115 volts, 50-400 cps
Power Consumption	3.5 watts
Weight.	6.5 lbs.
Size	3.75-inches wide, 6.75-inches high, and 16.5-inches deep

Table of Standard Tuning Ranges*

Receiver Type	Over-all Freq. Range (mc)	Band A Freq. Range (mc)	Band B Freq. Range (mc)	Band/Alignment Frequencies (mc)**			
				Ch1	Ch2	Ch3	Ch4
415-1	60-90	60-75	75-90	A/60	A/75	B/75	B/90
415-2	75-110	75-90	90-110	A/75	A/90	B/90	B/110
415-3	90-130	90-105	105-130	A/90	A/105	B/105	B/130
415-4	110-150	110-125	125-150	A/110	A/125	B/125	B/150

Notes: * - Crystal frequencies determined as follows where f_c is the crystal frequency and f_o is the operating frequency:

$$415-1: f_c = f_o + 21.4 \text{ mc}$$

$$415-2, -3, -4: f_c = f_o - 21.4 \text{ mc}$$

** - Units are shipped to operate on the bands and alignment frequencies shown in the table unless otherwise specified.

PRICE: \$995.00

FOB Rockville, Maryland. Taxes extra where applicable. Price and specifications subject to change without notice.

TECHNICAL DATA



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